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PROGNOSTIC ASPECTS EVALUATING PROFESSIONAL RISK OF WORKERS' HEALTH (BY THE EXAMPLE OF OJSC "IVATSEVICHDREV")

The article dissects the techniques for occupational risk assessment, oj workers health. The aufhor considers danger indentijication, occupational risk assessment, order of risk arrangements decnease its reoliration. Risk assessment represents much deeper investigation process of all possible dangerous and harmful factors oj manufacturing and occupational process. This process lights the situations in which these factors can badly affect the worker′s health and determines the severity of this effect.

Introduction. Purpose of the research is to consider the prognostic assessment of professional risk of workers' health.

Nowadays the management systems of quality are well known. They were created on the basis of international standards ISO 9000 by International Organization for Standardization (ISO).

The specification of OHSAS 18001 "Management system of occupational health and safety" correspond to the international standards ISO 9001 and ISO 14001 by its structure and ideology controls. General requirements for OHSAS 18001 to the management systems are used in practice in many countries, although it is not an official international standard.

On the bases of OHSAS 18001 STB 18001-2005 "OSH management systems" was introduced by State Standard of Belarus in 2005. General requirements and the state standard STB 18002-2005 "STB 18001-2005 reference guide" with recommendations on implementation of the OSH management system.

At present a standard STB 18001-2009 is applicable in the Republic of Belarus. The OSH management system can be built on its bases in any organization.

Safety management system (SMS) – part of the organization's management system which provides risk management in the field of occupational safety, health and safety issues related to the activities of the organization.

In order to reduce occupational accidents in accordance with Article 13 of the Law "On protection of labor" (2009), the employer should provide the list of dangers, assess the occupational risks, prepare and implement measures to reduce the risks with analysis of their effectiveness.

Main part. The concept of "occupational risk" was first introduced in the decree of the President of the Republic of Belarus (2003) "On compulsory insurance against industrial accidents and occupational diseases". A new concept of "occupational risk" was introduced by Decree of the "President of the Republic of Belarus (2006) "On insurance activity".

The difficulty in solving problems of estimating occupational risk for our country is largely due to the fact that for many years we haven't even practice the use of the term "risk".

Belarus has gained significant experience in the development, implementation and certification of OSH management systems in accordance with the STB 18001.

In STB 18001-2009 the concept "risk" has different content in comparison with the STB 18001-2005. The risk includes:

– Occupational risk (within the meaning of the Law "On protection of labor".

– Other risks associated with the activities of contractors, suppliers, other employees, customers, clients, etc.

With this definition if there is not "another risk", the word "risk" is identical to "occupational risk".

Due to the fact that the activity for safety consider only one risk – the risk of health damage, verbal combinations such as "occupational risk", "organizations' risk concerning labor", "risks of the organizations' activity" in our opinion should become out if use.

The danger can not be eliminated or reduced. You can protect workers against risks or contemporarily speaking to reduce the risk of health damage of the workers.

Risk assessment should become initial in the implementation of the entire follow-up activity for health and safety. Inaccurate and unreliable results of the risk assessment can be a basis for taking wrong decisions and serious material damage due to the implementation of such decisions.

Risk is a multiple-factor category. The complexity of its evaluation is that not only risks that have impact on the health and working capacity, risks of the working environment and the nature of the work process should be taken into account but also personal factors which depend on the behavior of workers and their fulfillment of the requirements of safety and occupational health as well as the actions of other legal entities and individuals [2].

There are numerous approaches to the study of the risks associated with the health and safety of humans:

– The methods of insurance statistics based on the mass observation of cases of loss of health incidents due to accidents and diseases;

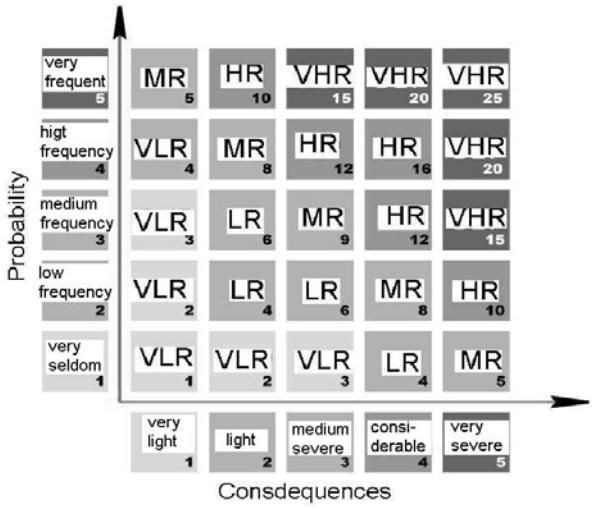
– Methods of risk assessment by Rosser's scale used for quantitative analysis of deterministic effects and to determine the relationship between the degree of injury and lost time of life;

– Assessment using risks maps. In many EU countries risk matrix are widespread which significantly facilitates the process of risk classification.

On the risk assessment methods. Nowadays there are a lot of methods of the overall assessment of professional (production) risk as well as risk assessments under the influence of individual factors used in various industries.

Conventionally all used methods of the occupational risk assessment can be divided into quantitative and qualitative.

Let's consider the simplest *qualitative method* of preliminary analysis especially when there are no relevant data or very little. It is a method of diagrams in the coordinate system of "probability of an event (axis *y*) – consequences of the event (axis *x*)" (Figure). These diagrams are usually presented in risk category on the ratio of the probability of the event and the severity of its impact (see Table).



Risk matrix

Risk matrix shows the dependence of the risk level (category) on the ratio of the event probability and the severity of its effects.

Probability and consequences of a hazardous event are divided into five categories, each of which is characterized by qualitative characteristics: *very low, low, medium, high and very high*. Then these categories get the appropriate color of danger, or points, for example, from 1 to 5. The risk value will be equal to the total sum of points characterizing the event probability and its consequences. So, the frequent event estimated by experts at 5 points, resulting in a slight impact, estimated at 2 points, is a high level of risk with the value of 10 points.

Explanation of the risk matrix

Level (category) of risk	Risk value	What should be done?
VLR (very low risk)	1–3	Performing the current procedures
LR (low rosk)	4–6	Performing specific procedures concerning for the occupational safety by responsible executive
MR (medium risk)	5–9	Requires appropriate monitoring and implementation of special procedures and requirements
HR (high risk)	10–16	Requires systematic actions, informing top management for taking decisions
VHR (very high risk)	15–25	Requires immediate actions

This method of evaluation is a little bit simplified because it ignores the so-called human factor underlying the 60 ... 70% of the accidents.

Quantitative risk assessment methods can be direct or indirect.*Direct risk assessment methods* involves identifying the potential risks, expert assessment of the probability of their occurrence in various versions, including the severity of the possible consequences of each option.

Indirect risk assessment methods does not involve the direct detection and identification of risks at work and during performing manufacturing operations. The essence of indirect risk assessment is based on the assumption of accounting of all (or most) risks in the regulations on labor protection, industrial and fire safety (government, industry, etc.).

Despite the fact that there are more accurate methods of occupational risk assessment based on the use of mathematical tools, simplified expert risk assessment are more common in practice. Sometimes the use of such methods is simply necessary (particularly for entire industries).

Currently about 90% of the Belarusian organizations to assess occupational risks during the development and certification of OSH management systems mainly use the risk assessment method on the probability of their occurrence and severity of consequences. This method is taken as a basis for "Guidelines. OSH management system". The procedure of risk assessment in the sphere of labor approved by the State Committee for Standardization of the Republic of Belarus and is recommended for organizations that set accidents and injuries over a long period of time. Risk assessment (R) is to find the multiplication between the risk probability(R) and the severity of the consequences of hazard exposure(S):

$$R = P \cdot S,$$

where R – risk value; P – probability of danger; S – consequences seriousness of danger.

In case of absence of statistical values the probability of danger can implemented by quality characteristics. Risk assessment by this method in the organizations is usually implemented by the employer, often – with the assistance of independent experts. Therefore, the completeness of the work depends on the skills and experience of the expert who decides how to categorize the probability and severity of adverse effects based on his knowledge, experience, feelings. Here exists a large share of subjectivity, i.e. the final results are largely dependent on the skill and experience of the expert what does not allow talking about their credibility and objectivity.

In practice the risk assessment method is also used on basis of Elmer system built on the definition of safety index which is equal to the ratio:

$$\frac{\text{Points “good”}}{\text{Points “good”} + \text{points “good}} 100\%.$$

For example, the ratio of 60% shows that 60 out of 100 points meet the requirements. The main disadvantage of Elmer is that all of the factors that influence the safety accepted as equivalent without accounting their weight (for example, lack of protections when working at height and the narrow width of aisles between the tables in the accounting department).

This system does not affect the assessment of the specific risks – the detection and identification of risks at work. Application of this system allows you to schedule events on health and safety for a specific purpose – to eliminate the detected discrepancy.

However in practice a number of challenges and issues cause hazard identification and risk assessment at work.

Risk assessments are often differ although they are made in the same organization by the same method for the same work or profession. This demonstrates the significant role of the subjective factor in this assessment.

Hazard identification, risk assessment and the management measures. The organization should establish, implement and maintain a procedure for permanent hazard identification, risk assessment and necessary control.

Hazard identification and risk assessment should be a process of in-depth study of all the possible harmful and dangerous factors of working environment and labor process in order to identify the situations in which they can make harm to workers' health and how serious it can be.

Sometimes individual maps for hazard identification and risk assessment does not cover even the dangers and hazards for which measures to protect workers and labor safety instructions are provided. So the results of risk assessment and safety instructions are not connected to each other.

The results of hazard identification and risk assessment should be taken into account during the development or refinement of content regulations on labor protection.

Data taken from the card certification of workplaces on working conditions for mapping the hazard identification and risk assessment do not cover all factors associated with the risk of health damage.

That’s why as for certification of workplaces hazard identification and risk assessment should be carried out after reducing conditions to regulatory requirements, in case of fulfillment of requirements and occupational safety and health by workers as well as technological requirements for work area.

The study of hazards and risk assessment can not be performed in organization during which the requirements of the safety regulations are violated, such as:

– On equipment where risk assessment is conducted, there is no ground, fencing rotating parts of machines;

– There is no personal protective equipment;

– Works do their work in a state of alcohol or drugs intoxication;

– Faulty lighting system;

– There are other gross violations of safety requirements.

The problem in these methods is the question of the *value of acceptable risk*.

In contrast to the assessment of working conditions where workplace assessment required applying the state hygienic standards, during risk assessment the organization set itself indicator of its acceptability.

The value of acceptable risk is established based on the amount of resources allocated to health and safety. The illusion of OSH’ prosperity is created by this artificial method.

In our country the number of economy employed is 4649.6 thousand as of 01.01.2012 [3]. 736 people was seriously injured in accidents in 2011 were, then a professional injury risk will be:

$$R = n / N = 736 / 4\,649\,600 = 1.58 \cdot 10^{-4}.$$

This is the area of unacceptable risk injuries (10^{-6} per year) but less the socially acceptable level of risk ($6 \cdot 10^{-4}$ per person per year).

The R and D project GB 25-11 is performed at the Department of Life Safety. It examines health

and hygienic characteristics of the technological process for the production of particleboard at OJSC "Ivatsevichdrev". At the beginning of 2012 he number of employees was 1.160 and in 2011 there was six accidents at this plant. Then the professional injury risk will be

$$R = n / N = 6 / 1{,}160 = 5.17 \cdot 10^{-3}.$$

As it can be seen from the calculation this figure is higher than the occupational injury risk in the country. It is equal to $R = 1.58 \cdot 10^{-4}$.

We can draw a conclusion that the enterprise "Ivatsevichidrev" doesn't pay enough attention to creating a safe working environment, the prevention of occupational accidents and occupational diseases.

Conclusion. Presence of subjectivity in health risk assessment of workers combines all methods.

The most acceptable option for the occupational risks assessment is a combination of subjective (expert evaluation) and objective approaches.

The basis of an objective approach should be the evaluation of working conditions at each workplace identifying harmful and (or) dangerous factors linked to the consequences of health workers violations by workers.

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